Toka M. Amer Frihy

A Doctoral Portfolio

EVALTECH
research & development.

A.D. 1308
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UNIVERSITÀ DEGLI STUDI
DI PERUGIA

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1 Overview

I am particularly drawn to work at the intersection of people, systems, and performance, where curiosity and understanding become means of practical and meaningful impact.

Toka M. Amer Frihy

Doctoral Candidate
Energy and Sustainable Development
Department of Engineering
University of Perugia, Italy

Expertise

Human comfort in buildings
Indoor Environmental Quality (IEQ)
Living Lab research
Building performance assessment
Sensor data and applied analytics

Research Interests

Multi-domain comfort in indoor environments
Human-centered and data-informed building operation
Occupant behavior, perception, and workplace wellbeing
Building performance gap and real-world building use
Energy efficiency in relation to comfort and usability

Languages

English – Native Proficiency
Arabic – Native
Italian – Basic understanding

1.1 Short Biography

Toka is a Marie Skłodowska-Curie Researcher and PhD candidate in Energy and Sustainable Development at the University of Perugia, hosted by EvalTech R&D (Valeri Engineering & Management S.r.l.) within the Horizon Europe MuSIC Doctoral Network. Her research focuses on Living Labs, multi-domain human comfort, and building energy efficiency, with particular attention to how real environments can be used to better understand the relationship between people, building performance, and indoor environmental quality. Her academic background combines architecture, digital built environments, and applied research, with a BA (Hons) in Architecture (International) from the University of Huddersfield and an MSc in Building Information Modelling and Digital Built Environments from the University of Salford. Alongside her doctoral work, she brings several years of experience in scientific publishing, editorial management, and international conference coordination, which have strengthened her interdisciplinary perspective and communication skills.

1.2 Professional goals

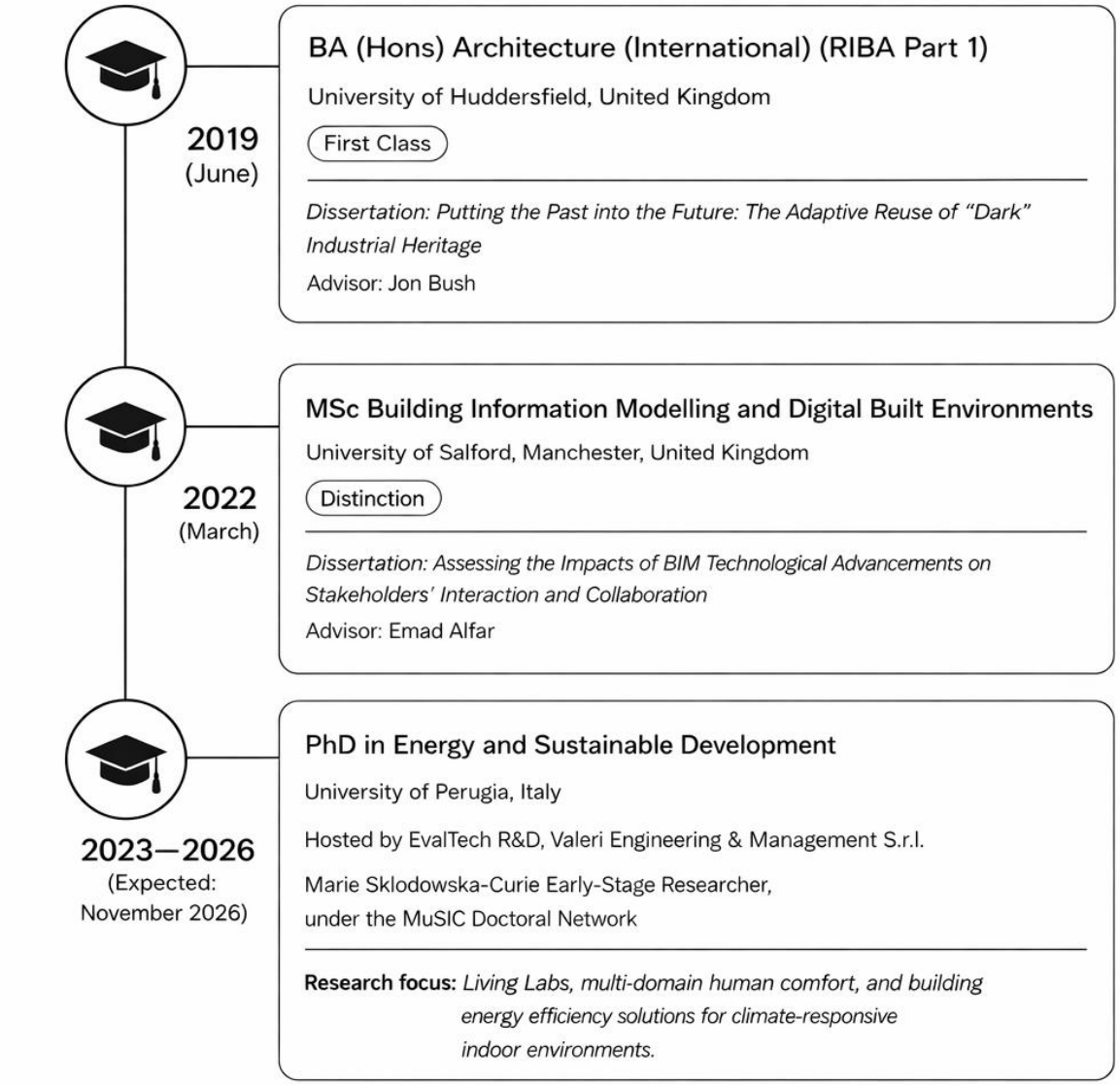
Toka's professional goal is to contribute to the development of healthier, more adaptive, and better-performing buildings by connecting scientific research with practical implementation. Her long-term direction lies at the intersection of research and industry, where evidence from real users, real buildings, and real operational conditions can inform design, building services, and decision-making more effectively. She aims to further specialize in multi-domain indoor environmental quality, human-building interaction, and performance-driven workplace strategies, while supporting the translation of research into scalable and practice-oriented solutions. She is particularly interested in roles that bridge innovation, applied research, and implementation, helping shape indoor environments that are not only energy efficient, but also responsive to comfort, wellbeing, and productivity.

1.3 Vision Statement

For Toka, research is not an abstract exercise, but a sustained engagement with questions that matter in practice and remain worth pursuing with rigor, clarity, and purpose. Her work is grounded in a strong interest in people, systems, and performance, and in understanding what is not yet working, not yet connected, or not yet fully understood. The broader aim is to help close the gap between research and application by contributing knowledge that is both human-centered and operationally useful.

2 Studies and Qualifications

2.1 Education



2.2 Other Certificates & Training

Training School on Knowledge Transfer in and through Living Labs
RWTH Aachen University, Aachen, Germany| 24 – 28 June 2024

MuSIC Project Training Weeks
(i) 15 – 19 Jan 2024 | UNIPG, Italy; (ii) 27-31 May 2024 | University of La Rochelle, France; (iii) 25-29 Nov, 2024 | University Hospital RWTH Aachen, Germany; (iv) 19 – 23 May 2025 | The Cyprus Institute, Cyprus

+ Early years

The Lincoln School of Architecture International Summer School: Rethinking Architecture, 4 – 14 July, 2012 | Lincolnshire, UK

3 About MuSIC

MuSIC (Multi-sensory Solutions for Increasing Human-Building Resilience in the Face of Climate Change) is a Horizon Europe Marie Skłodowska-Curie Doctoral Network that investigates how indoor climatic conditions should be understood and designed in response to climate change, the energy crisis, and changing patterns of occupancy and wellbeing. Rather than addressing single environmental stimuli in isolation, MuSIC adopts a multisensory perspective, examining how thermal, visual, acoustic, and air-quality conditions interact in shaping human perception, health, comfort, and behaviour. The network combines academic and non-academic partners to train doctoral candidates through interdisciplinary research, secondments, and advanced scientific and transferable-skills training, with the broader aim of developing more liveable, resilient, and sustainable indoor and outdoor environments. The network brings together beneficiaries and associated partners from universities, research institutes, and industry to strengthen knowledge exchange and support innovation across research and practice.

3.1 Individual Research Project (IRP) 9 –Overview

Living lab for human comfort and building energy efficiency solutions

Host Institution: EvalTech R&D, Valeri Engineering & Management S.r.l., in collaboration with the University of Perugia, Italy.
Main supervisor: Dr. Eng. Benedetta Pioppi
Co-supervisor: Professor Anna Laura Pisello

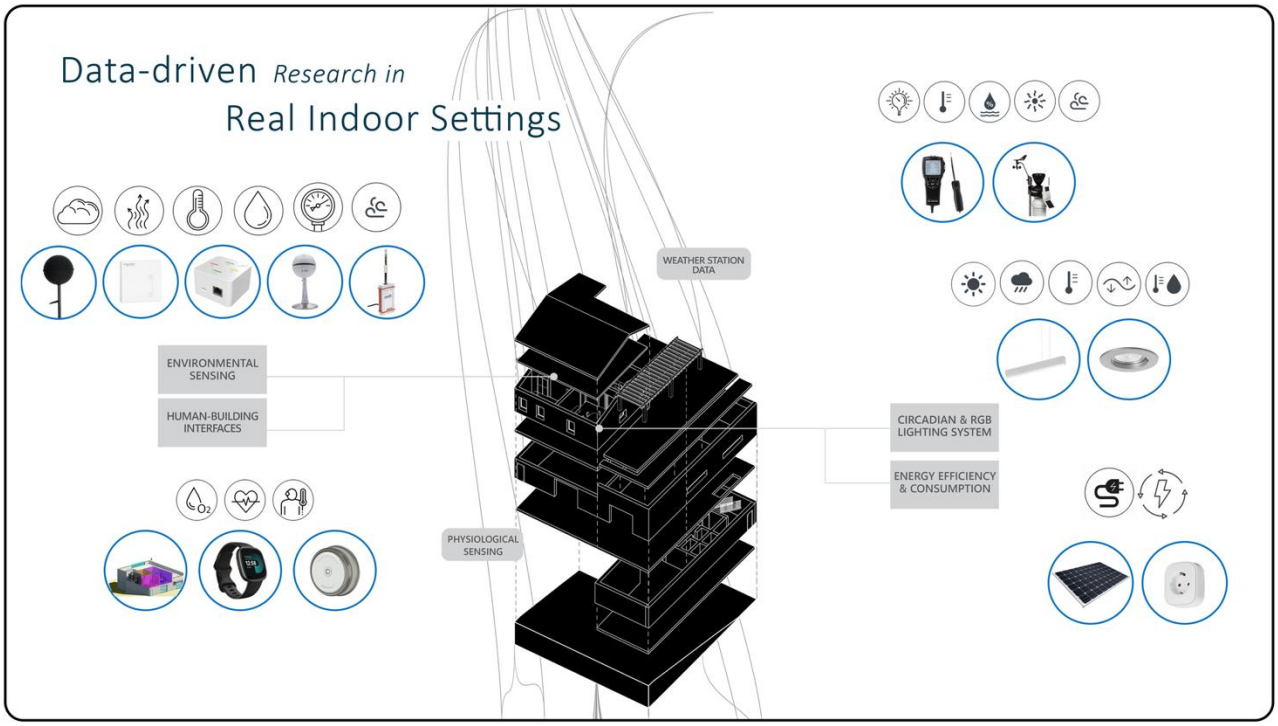
IRP9 focuses on the creation and use of an office living lab for testing innovative building energy-efficiency solutions while accounting for human comfort and occupants' behavior. The project is grounded in the idea that buildings should not be evaluated only through technical or energy metrics, but also through how they are experienced in use. Within this framework, the living lab serves as a real indoor environment equipped for environmental monitoring, control, and user-centered investigation.

The project's objective is to support the development of building strategies that are both energy efficient and responsive to human needs. Methodologically, it combines the setup and operation of a monitored office living lab with data collection across multiple domains of indoor environmental quality, including thermal, visual, acoustic, and air-quality conditions, alongside subjective and behavioral responses. This enables the study of human-building interaction in realistic yet research-oriented settings, bridging the gap between controlled experiments and real-world operation.

3.2 DC9 Role

Within MuSIC, DC9 contributed to the development and operation of the EvalTech office living lab as a platform for investigating human comfort and building energy efficiency in real indoor settings. The role includes supporting its setup, instrumentation, and

monitoring framework, while exploring how environmental conditions, occupant responses, and operational strategies interact in practice.



LL set up supporting IRP9, integrating environmental sensing, physiological monitoring, human-building interfaces, and energy-related systems.

3.3 Living Lab Objectives and Context

- Improve functional comfort through the integration of environmental sensors and physiological systems
- Enable testing and validation of sensors and technologies in real indoor environments
- Support multi-domain comfort assessment and personalized comfort solutions
- Monitor environmental, physiological, and perceptual responses
- Study occupant behavior and interaction with building systems
- Aggregate and process environmental and human data to support comfort optimization
- Use building management and monitoring systems to visualize, control, and improve conditions based on measured data and user needs

The expected impact of IRP9 lies in advancing evidence-based and human-centered approaches to building performance. By linking operational conditions, environmental monitoring, and occupant experience, the project aims to contribute to more adaptive, practical, and scalable solutions for comfort, wellbeing, and energy efficiency in existing buildings. This work also supports broader academia-industry knowledge transfer within the MuSIC network.

4 Professional experience

4.1 Research & Academic

Marie Skłodowska-Curie Doctoral Fellow
EvalTech R&D (Valeri Engineering & Management S.R.L.)
Giano dell'Umbria, Italy | Nov 2024–present

Marie Skłodowska-Curie Doctoral Fellow / Secondment
University of Perugia, EAPLAB
Perugia, Italy | Nov 2023–Nov 2024

Visiting Researcher/ Secondment
DataBuilt, Oosterhoff Group
Geleen, The Netherlands | June 2025–Sept 2025
Supervised by Eric Williams and Loes Visser

Assistant Lecturer
SSP / Architecture & Construction, Faculty of Engineering, Alexandria University.
Alexandria, Egypt | 2022–2023

4.2 Professional Experience

Operations Manager
International Experts for Research Enrichment & Knowledge Exchange (IEREK)
Alexandria/Cairo, Egypt | June 2019–Oct 2023
Coordination of international scientific events, academic partnerships, publishing operations, and cross-departmental workflows, with a focus on research dissemination, quality assurance, and knowledge exchange across academia and practice.

Managing Editor / Associate Editor
Advances in Science, Technology and Innovation (ASTI), IEREK & Springer Nature collaboration
Alexandria/Cairo, Egypt | 2017–Oct 2023
Managed editorial and peer-review workflows for four IEREK book series – working across authors, editors, reviewers, and publishing teams to support scholarly communication and publication quality.

Event planning & Publishing Associate (PT/FT)
Alexandria, Egypt, 2015–June 2019
International Experts for Research Enrichment & Knowledge Exchange (IEREK)
Supported the planning and delivery of conferences, workshops, journals, and study-abroad programs, contributing to academic coordination and organizational development.

+ Selected projects (IEREK):

Mediterranean Cities' Gateways Development for Better Freight Transport (2015) - ENPI CBCMED 2014 – 2020; Future of Our Past - Società Geografica Italiana, European

Neighbourhood and Partnership Instrument cross-border cooperation Mediterranean Sea Basin Programme (ENPI CBC MED) (2017).

4.3 Methods, Tools, and Technical Expertise

Experienced in multi-sensor environmental and physiological monitoring for human comfort and building-performance research, including thermal, visual, air-quality, physiological, and related subjective-response data. Proficient across the full workflow from field and Living Lab data collection, monitoring setup, and BMS-supported operation, to data management planning, cleaning, synchronization, feature engineering, statistical analysis, visualization, and interpretation. Tools used include **Python** for data cleaning, analysis, modelling, and visualization; **AutoCAD** and **Revit** for architectural and built-environment applications; **Adobe InDesign, Photoshop, and Illustrator** for visual documentation and communication; and **editorial, publishing, communication, and operational management platforms** supporting academic and professional workflows.

4.4 Conferences, Presentations & Knowledge Exchange

Living Lab for Multi-domain Comfort, Well-being and Energy Efficiency Solutions
Knowledge Transfer in and through Living Labs
RWTH Aachen, Aachen, Germany
24–26 June 2024.

Living Lab for Human Comfort, Wellbeing and Energy Efficiency
XXIV Congresso Nazionale CIRIAF, University of Perugia, Italy
11–12 April 2024.

Living Lab for Human Comfort, Wellbeing and Energy Efficiency
XXV Congresso Nazionale CIRIAF, University of Perugia, Italy
7 April 2025.

+ Selected client presentations (EvalTech R&D)

Delivered presentations to industry stakeholders on research-informed renovation and building-improvement strategies developed through Living Lab and comfort-performance investigations.

5 Publications

5.1

Pisello, A. L., Amer, T. M., & Pioppi, B. (2025).
Ten questions concerning living laboratories (LL) for multi-domain comfort investigations.
Building and Environment, 276, 112750. DOI: 10.1016/j.buildenv.2025.112750.
This paper examines Living Labs as research environments for multi-domain comfort investigations, discussing their methodological value, challenges, and relevance for real-world human-building studies.

Highlights

- Defines Living Labs for multi-domain comfort research and traces their evolution.
- Critically compares test rooms, Living Labs, and field investigations for comfort research.
- Examines largerly unexplored areas such as distinctions between academic vs non-academic LLs, the practical and economic advantages of Living Labs for non-academic institutions, and the role of emerging technologies.
- Discusses practical, economic, and technological opportunities for Living Labs in applied contexts.
- Identifies key challenges, limitations, and transfer potential for human-centric building research.

5.2

Amer, T. M., Chiucchiù, A., Pioppi, B., & Pisello, A. L. (2025).
Is discomfort enough? Evaluating multi-domain stressors as drivers of seat selection in open plan offices.
[Submitted for publication.] This work investigates how thermal, visual, acoustic, and indoor air quality stressors influence seat selection and comfort outcomes in open-plan office environments.

Highlights

- Examines the role of comfort-informed seat allocation in reducing multi-domain IEQ stressors in open-plan offices.
- Shows that comfort-led seating is associated with lower discomfort and improved productivity outcomes.
- Demonstrates that discomfort is shaped by combined IEQ and spatial conditions and only partly explained by stated preferences.
- Proposes a low-cost IEQ + spatial + seat-factor framework to identify discomfort hotspots and support occupant-centric seating strategies.

5.3

Salehi, M., Amer, T. M., Papadopoulos, P., Kyprianou, I., Kampelis, N., Carlucci, S., Nicolaou, M., Pisello, A. L., & Pioppi, B.
[Manuscript in preparation.] Learning Occupant Preferences from Small POE Datasets: A Cross-Domain, Noise-Aware Machine-Learning Framework.

Highlights

- Proposes a noise-aware machine-learning framework for learning occupant preferences from small POE datasets.
- Examines the impact of class granularity, feature engineering, and imbalance handling on model performance.
- Shows that engineered features improve Macro-F1 across thermal preference schemes.
- Demonstrates that Confident Learning improves robustness to label uncertainty across thermal, visual, and IAQ domains.
- Supports a scalable and replicable pipeline for POE-derived preference classification under realistic data constraints.

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